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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/664,875	09/22/2003	Naoteru Matsubara	65933-044	4231

7590 12/18/2006
McDERMOTT, WILL & EMERY
600 13th Street, N.W.
Washington, DC 20005-3096

EXAMINER

IM, JUNGHWA M

ART UNIT	PAPER NUMBER
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2811

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	12/18/2006	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/664,875

Applicant(s)

MATSUBARA ET AL.

Examiner

Junghwa M. Im

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 9/18/2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) 6-17 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5 and 18-22 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 9/2006.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on September 18, 2006 has been entered.

Claim Objections

Claims 4 and 21 are objected to because of the following informalities: The term "second dielectric Films" in claims 4 and 23 should be -- second dielectric films-- .

Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-5 and 18-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gates et al. (US Pat. 6,603,204), hereinafter Gates in view of Ma et al. (US Pat. 6,764,810), hereinafter Ma.

Regarding claims 1 and 18, Fig. 8 of Gates shows a semiconductor device comprising:

a semiconductor substrate [50];

a multilayered film including a first dielectric film [54'], an etching stopper [56'] and a second dielectric film [58'] stacked on said semiconductor substrate in this order; and

a via plug [a narrow portion of the metal layer 74 in the layer 54'] and a metal interconnect [a wide portion of the metal layer 74 in the layer 58'], which is formed on the via plug, formed in said multilayered film, wherein

the dielectric constant [k] of said etching stopper is larger than that of said first and second dielectric films ($k=1.4-3.5$ for the first and second dielectric films, $k=1.1-5.5$ for etching stopper; col. 4, lines 9-64).

Fig. 8 of Gates shows most aspects of the instant invention except "the upper surface of said etching stopper is located under the upper surface level of said metal interconnect, the under surface of said etching stopper is located over the under surface level of said metal interconnect, and the under surface of said metal interconnect is located inside the first dielectric film."

Figure 1H of Ma shows a metal interconnect [a wider portion of the trench 20] wherein the upper surface of the etching stopper [14; col. 5, lines 57-59] is located under the upper surface level of said metal interconnect, the under surface of said etching stopper is located over the under surface level of said metal interconnect, and the under surface of said metal interconnect is located inside the first dielectric film [12].

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to incorporate the teachings of Ma into the device of Gates in order to have the upper surface of the etching stopper located under the upper surface level of said metal interconnect, the under surface of the etching stopper located over the under surface level of the metal

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interconnect, and the under surface of the metal interconnect located inside the first dielectric film to reduce a problem caused by residual masking material.

Regarding claims 2 and 19, Gates discloses the semiconductor device wherein the dielectric constant $[k=1.1-5.5]$ of said etching stopper is less than or equal to 5 (col. 4, lines 60-64).

Regarding claims 3, 4, 20 and 21, Gates discloses the semiconductor device wherein the dielectric constant of said etching stopper is larger than or equal to a summation of 2 and the dielectric constant of either one of the dielectric constants $[k=1.4-3.5]$ of said first and second dielectric films (col. 4, lines 15-20).

Regarding claims 5 and 22, Gates discloses said metal interconnect includes copper as a constituting element (col. 7, lines 30-35).

Response to Arguments

Applicant's arguments with respect to pending claims have been considered but are moot in view of the new ground(s) of rejection.

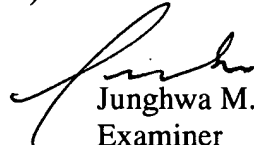
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Junghwa M. Im whose telephone number is (571) 272-1655. The examiner can normally be reached on MON.-FRI. 8:30AM-5:00PM.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard T. Elms can be reached on (571) 272-1869. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Junghwa M. Im
Examiner
Art Unit 2811

jmi
12/9/2006